

**WHAT IS CLAIMED IS:**

1. An apparatus for automated synthesis comprising: a shaker deck comprising a plurality of reaction blocks containing a plurality of reaction wells each reaction block being situated on a turntable, each turntable being further capable of rotating the reaction block along a central axis; wherein the apparatus is optionally controlled by a computer program.
2. The apparatus according to claim 1 wherein there are four reaction blocks in a shaker deck, the turntable having a universal mount for each type of reaction block, the said shaker deck further comprising shaker orbital agitation means and means for performing one or more steps selected from drainage, temperature control, pressure control and detection means.
3. The apparatus according to claim 2 wherein said apparatus possesses means chosen from liquid/liquid extraction, resin washing/workup, resin slurry dispensing, resin cleavage, solvent transfers, reagent transfers, online reagent dissolution, temperature control, pressure controlling and liquid sensing for pipette based separation of liquid phases of different densities.
4. The apparatus according to claim 1 further comprising an arm comprising an array of extending units capable of actuating physical steps along a plurality of axes of each reaction block.
5. The apparatus for automated synthesis according to claim 4 wherein the arm is situated on a slidable mount having bi-directional and lateral movement and each turntable is capable of rotating the reaction block up to 90 degrees along a central axis.
6. The apparatus for automated synthesis according to claim 5 wherein the extending units are dispensing modules having dispensing heads capable of delivering an amount of fluid to a well in the reaction block, the reaction block is docked to the turntable; the dispensing heads being capable of delivering one or more fluids to a single well sequentially or a plurality of wells at a single step.

7. The apparatus for automated synthesis according to claim 6 wherein the movement of the arm mount is a) in an  $x,y$  plane of the arm mount and performed by slidable lateral movement means located in an arm unit slot, and b) in a direction perpendicular to the slot by means capable of two way movement of the entire arm mount across the apparatus;  
wherein the dispenser head motion by movement of the arm and turntable in relation to reaction wells in the reaction block can be radial, linear or diagonal, or a combination of radial and linear.

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8. The apparatus according to any one of claims 1-7 wherein the automated synthesis can be performed in sequential stations possessing means chosen from fluid delivery, agitation, and fluid draining, or by combinations thereof; or can be performed at a single station the single station dedicated to fluid delivery, agitation or fluid draining or combinations thereof.

9. An apparatus for automated synthesis comprising one or more shaker decks, each shaker deck comprising a plurality of reaction blocks each individually mounted on a turntable, a housing which supports the turntable, the housing is fixed along a shaft of moveable support cams at one longitudinal end, which in turn are anchored to the housing at the other longitudinal end, the housing can be shaken by rotation means, wherein the apparatus is optionally controlled by a computer program.

10. The apparatus according to claim 9 further comprising an arm comprising an array of extending units capable of actuating physical steps in planar  $x, y$  coordinates and an axis perpendicular to said  $x,y$  coordinates of each reaction block.

11. A process of preparing a peptide, oligonucleotide or a small molecule, said process comprising:  
providing one or more appropriate reagents necessary for the synthesis of said peptide, oligonucleotide or a small molecule to an apparatus according to claims 1 or 9 ;  
programming a computer which controls the apparatus to be set up and prepared to deliver the appropriate reagents to designated wells in the reaction block in a desired

order and adding physical steps to create the peptide, oligonucleotide or a small molecule product.

12. The process according to claim 11 wherein the physical steps are chosen from  
5 one or more dispensing, incubating, extracting, washing, draining and agitating steps.

13. The process according to claim 12 wherein one or more physical steps are  
performed in sequential stations dedicated to fluid delivery, agitation or fluid draining  
or combinations thereof; or one or more physical steps are performed at a single station  
10 the single station dedicated to fluid delivery, agitation or fluid draining or combinations  
thereof.

14. The process according to claim 13 wherein the desired product is a library of small  
molecules synthesized on solid support.

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15. The process according to claim 13 wherein the desired product is a library of small  
molecules synthesized in solution phase comprising carrying out a series of chemical  
reaction steps where the desired product remains dissolved in solution throughout the  
synthesis.